
Rhode Island Hospital Trust Building

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NEES Chiller Initiative Strategy

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Rhode Island Hospital Trust

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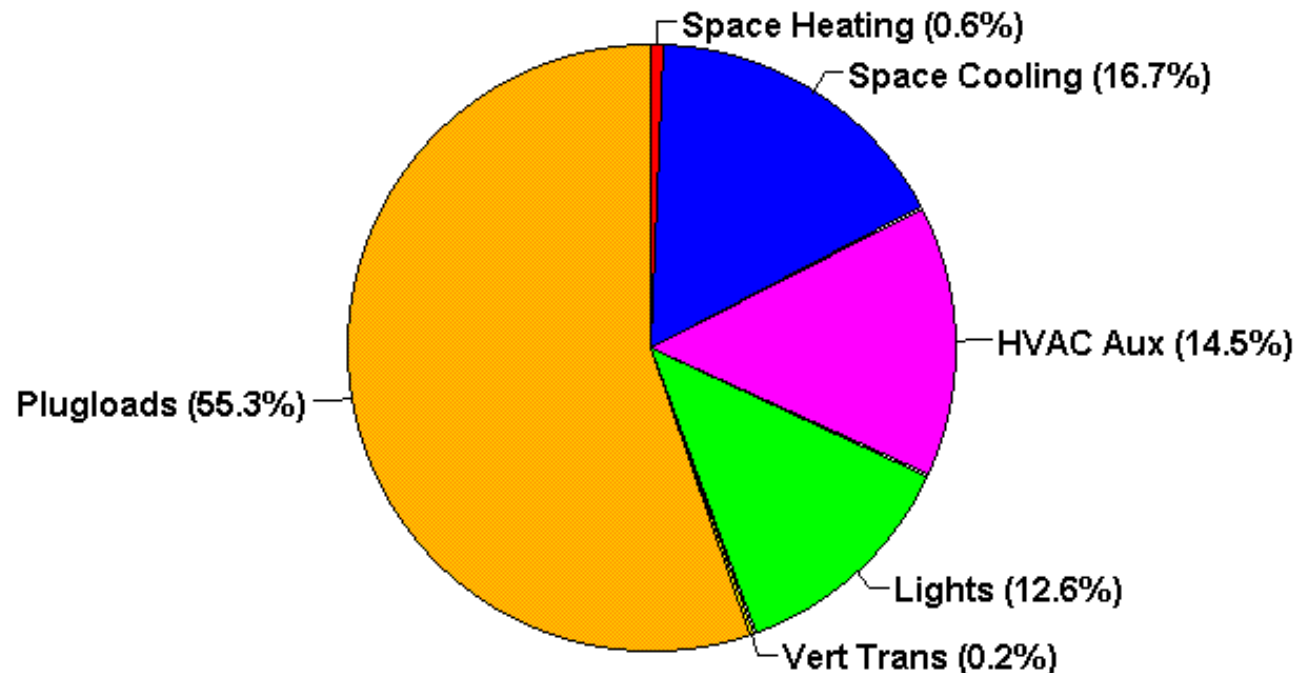


- Built in 1983
- 140,000 square feet
- Data processing & office space

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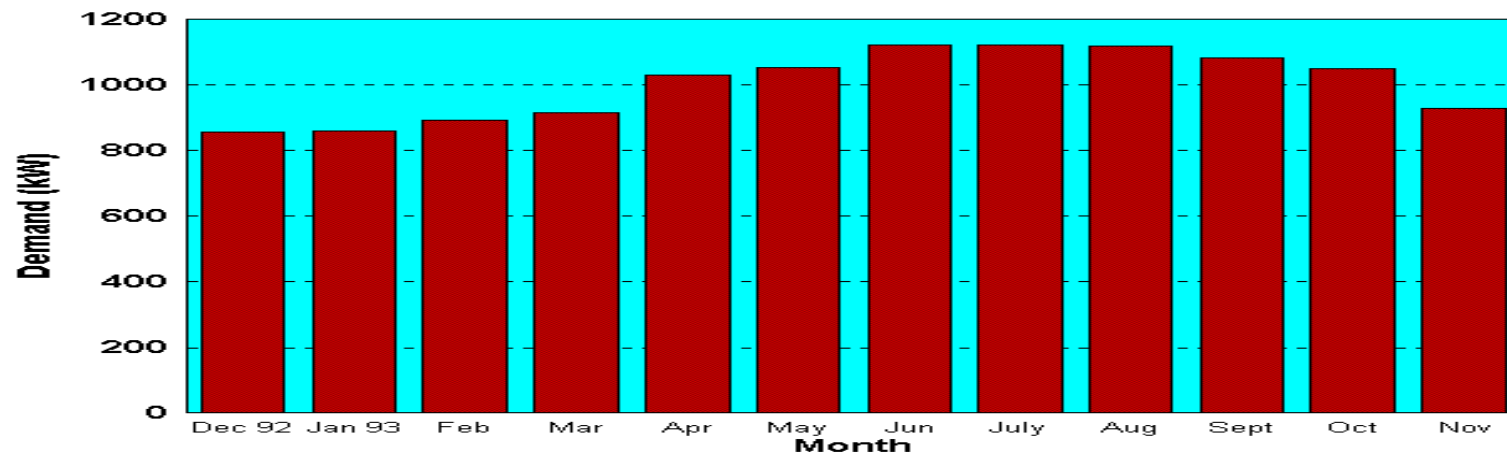
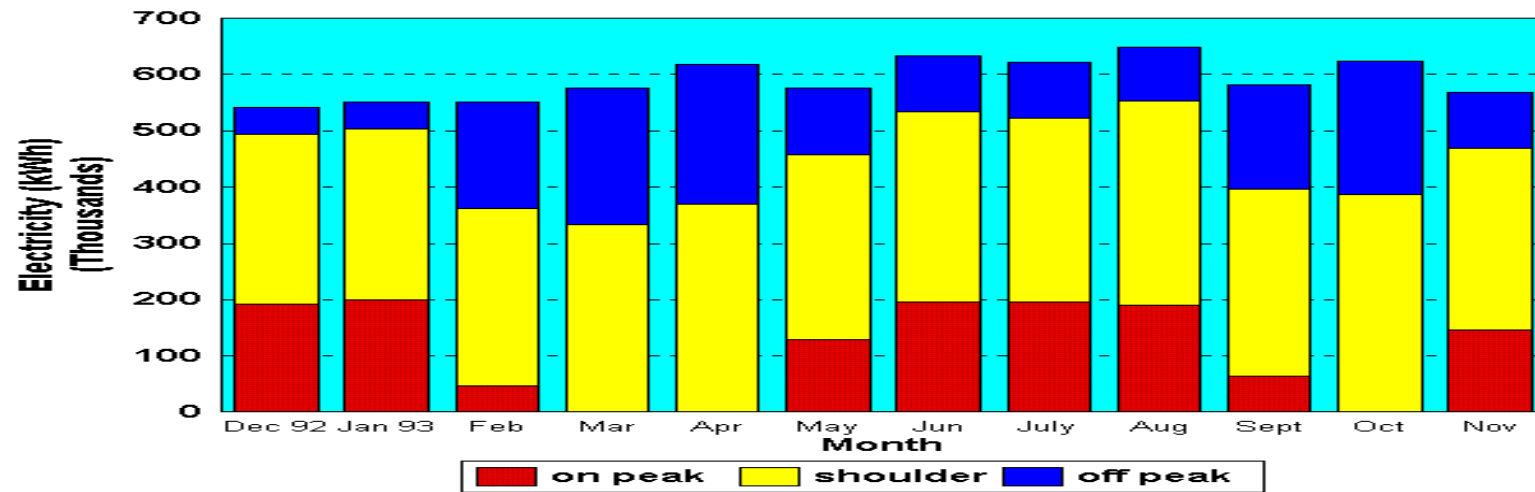
Electricity End-Use

- Annually
 - 7,092,000 kWh
 - \$596,000



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Monthly Electricity Consumption



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Main Building Cooling

- One 275 ton centrifugal chiller
- Electric powered
- R-11 refrigerant
- 0.655 kW/ton design peak, 0.75 kW/ton in actual operation
- 4 inlet guide vane, variable volume air handlers with pneumatic controls

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Data Processing Center Cooling

- 14 rooftop DX split systems
- Total capacity 208 tons
- 1.2 - 1.4 kW/ton
- Year-round, 24 hour operation
- Drycooler economizer
- Near end of useful life

Rhode Island Hospital Trust Building Scenario

- Need to reduce demand and on-peak electricity consumption
- Need to eliminate CFC's
- Building expanding by 50%, or 70,000 square feet
- Data processing units near end of life
- Plenty of room for equipment

Rhode Island Hospital Trust Building Energy Study

- New England Electric System (NEES) Chiller Initiative Strategy
 - examines all aspects of building's energy use at the time of CFC chiller replacement
 - combine retrofit opportunities with chiller replacement
 - reduce chiller plant size
 - optimize chiller efficiency

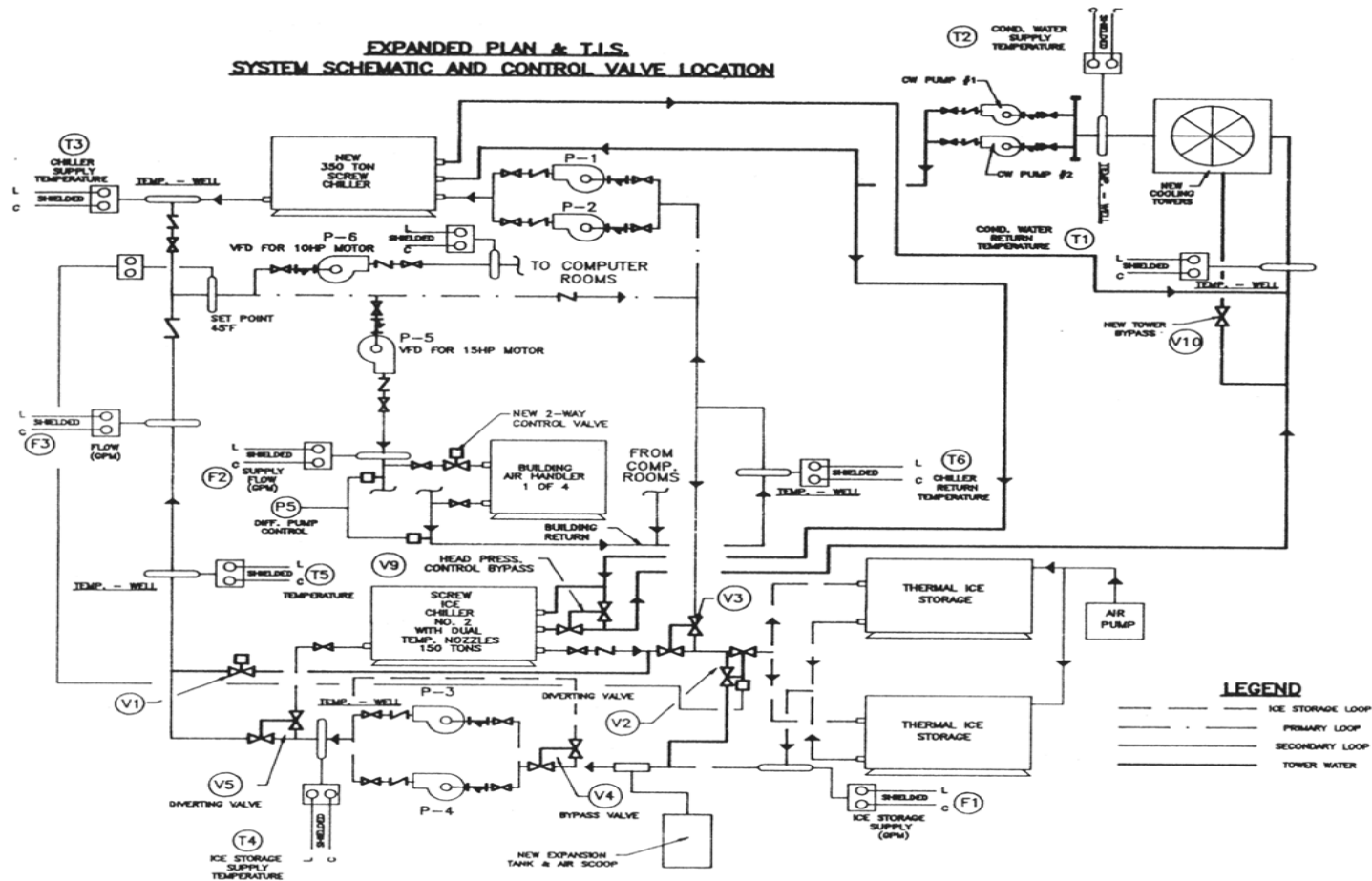
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Study Chiller Recommendations

- Ice storage system
 - 390 ton brine chiller
 - three 761 ton-hour ice banks
 - create ice at night, cooling load diverted to ice banks during the day
- 390 ton high efficiency brine chiller
 - meets summer loads in building and computer room
 - 0.62 kW/ton

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Cooling Plant Schematic



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Computer Room Cooling

- Rooftop units retrofit with chilled water coils
 - new water loop added to rooftop units
- Plate and frame heat exchanger used for wintertime cooling
- Original rooftop units kept for system backup capability

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Retrofit Opportunities

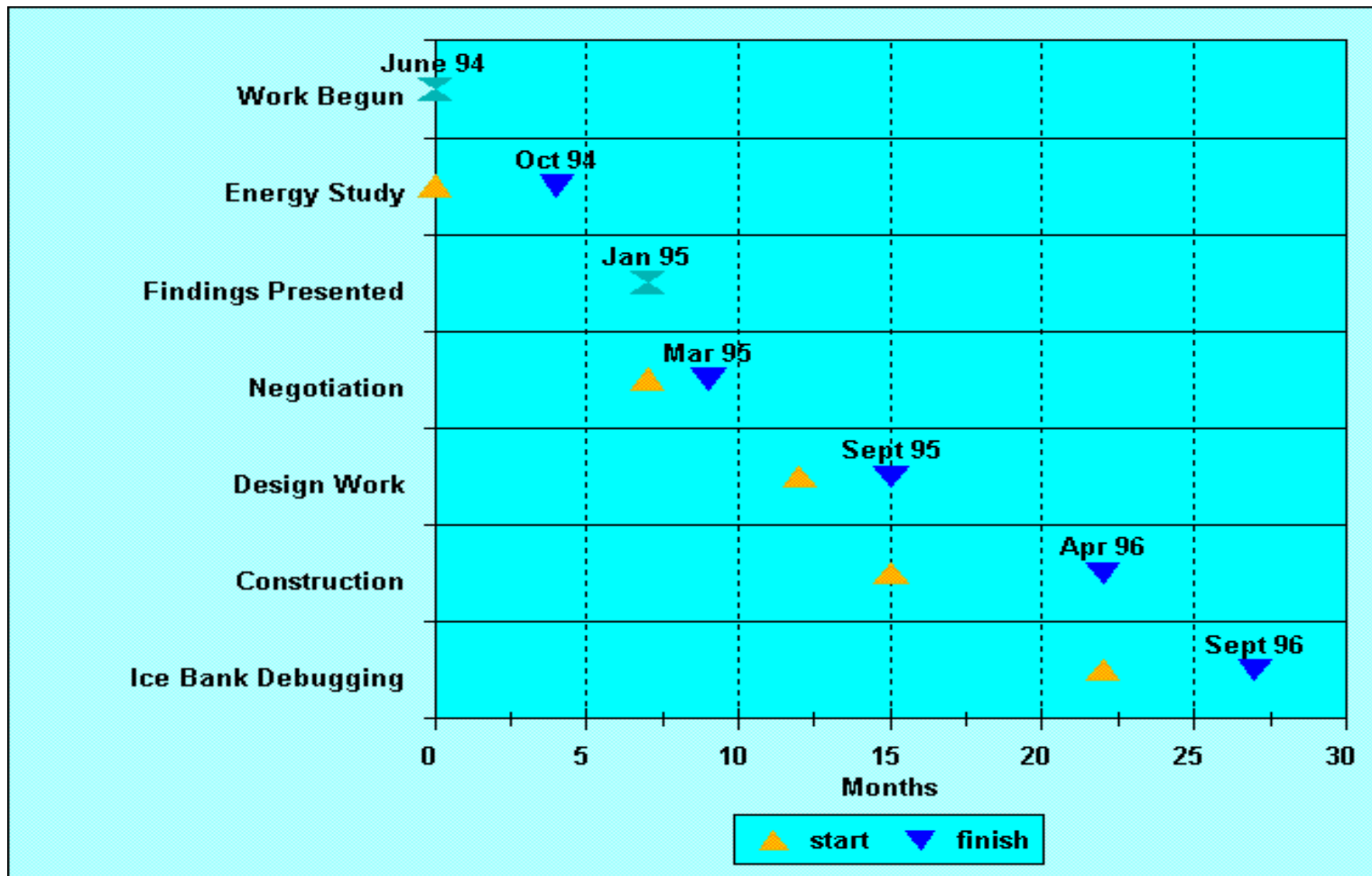
- Lighting improvements
 - initially fluorescent lighting with energy saving ballasts and lamps (circa 1987-89)
 - replaced with T-8 lighting system
 - added lighting occupancy sensors
- Variable speed drives
- High efficiency motors
- Energy management system

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Project Financing

- Total project cost \$1,200,000
- Utility incentives of \$575,000
 - Energy Initiative program covered EMS, variable speed drives, motors and lighting
 - Design 2000 covered chiller, ice system, heat exchanger, and water loop
- Estimated annual savings of \$196,000
- Overall project payback of 3.2 years

Rhode Island Hospital Trust Building Project Timeline



Rhode Island Hospital Trust Building Project Results

- Ice banks provide cooling energy storage
 - off-peak electricity use
- Improved energy and comfort control
- Reduced maintenance
- Energy cost savings of \$196,000 a year
- Payback of only 3.2 years for entire project
 - utility rebates reduced capital costs
 - integrated improvements reduced payback period

Rhode Island Hospital Trust Building Lessons

- Plan ahead for integrated retrofits
 - forward investment of time
 - management commitment
 - active participation of maintenance staff
- Investment higher than a simple chiller swap
 - energy savings is much greater
 - improved building comfort & occupant satisfaction
 - reduced maintenance & improved operator satisfaction